

respectfully request approval of this drawing change. Applicants will subsequently submit a formal drawing of Figure 2 upon allowance of this case.

REMARKS

Claims 1, 4-5, 7-8, 11-12 and 14 are pending in the Application. Claims 1, 4-5, 7-8, 11-12 and 14 are rejected under 35 U.S.C. §112. Claims 1, 4-5, 7-8, 11-12 and 14 are rejected under 35 U.S.C. §103(a). Applicants respectfully traverse the rejections for at least the reasons stated below and respectfully request that the Examiner reconsider and withdraw all outstanding rejections.

I. REJECTIONS UNDER 35 U.S.C. §112:

The Office Action has rejected claims 1, 4-5, 7-8, 11-12 and 14 under 35 U.S.C. §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Paper No. 16, Page 2. The Examiner further states that the limitation "wherein the thin photoresist layer is a thickness less than the gate height" as recited in claims 1 and 8 and in the Abstract are not supported by the original specification. Paper No. 16, Page 2. Applicants have deleted the limitation "wherein the photoresist layer is a thickness less than the gate height" in claims 1 and 8 and in the Abstract and believe the amendments address the rejections.

II. REJECTIONS UNDER 35 U.S.C. §103(a):

The Office Action has rejected claims 1, 4-5, 7-8, 11-12 and 14 under 35 U.S.C. §103(a) as being unpatentable over Hori et al. (U.S. Patent No. 5,320,974) (hereinafter "Hori") in view of Applicants' Specification. Applicants respectfully

traverse the rejections and respectfully request that the Examiner reconsider and withdraw all outstanding rejections.

A. **The Examiner Has Not Provided Any Motivation For Combining Hori and Applicants' Specification**

A *prima facie* showing of obviousness requires the Examiner to establish, *inter alia*, that the prior art references teach or suggest, either alone or in combination, all of the limitations of the claimed invention, and the Examiner must provide a motivation or suggestion to combine or modify the prior art reference to make the claimed inventions. M.P.E.P. §2142. The motivation or suggestion to combine references must come from one of three possible sources: the nature of the problem to be solved, the teaching of the prior art and the knowledge of persons of ordinary skill in the art. *In re Rouffet*, 47 U.S.P.Q.2d. 1453,1458 (Fed. Cir. 1998). The showings must be clear and particular. *In re Lee*, 277 F.3d 1338, 1343, 61 U.S.P.Q.2d 1430, 1433-34 (Fed. Cir. 2002); *In re Kotzab*, 217 F.3d 1365, 1370, 55 U.S.P.Q.2d 1313, 1317 (Fed. Cir. 2000); *In re Dembiczak*, 50 U.S.P.Q.2d. 1614, 1617 (Fed. Cir. 1999). Broad conclusory statements regarding the teaching of multiple references, standing alone, are not evidence. *Id.*

In order to reject under 35 U.S.C. §103, therefore, the Examiner must provide a proper motivation for combining or modifying the references. *In re Rouffet*, 47 U.S.P.Q.2d. 1453, 1457-1458 (Fed. Cir. 1998); M.P.E.P. §2142. The Examiner's motivation for modifying Hori to use a Deep Ultra Violet (DUV) photoresist is "*for at least the purpose of protecting the desired surface of the substrate from the implantation beam.*" Paper No. 16, Page 4.

There can be no motivation to modify Hori by Applicants' Specification. As stated above, the Examiner's motivation for modifying Hori to use a DUV photoresist

is to *protect the desired surface of the substrate from the implantation beam*. This is the Examiner's subjective opinion, and is not supported by any objective evidence. ←
Further, Applicants respectfully traverse the assertion that a photoresist layer is used to protect the desired surface of the substrate from the implantation beam. Instead, photoresists are chemical compositions containing a lightness-sensitive material and suspension. These photoresists are used in the photolithographic process involving the transfer of an image from the mask to the surface of the wafer. Further, the Examiner has not shown why Hori should be modified to *use a DUV photoresist from either the nature of the problem to be solved, the teaching of the prior art and the knowledge of persons of ordinary skill in the art*. *In re Rouffet*, 47 U.S.P.Q.2d 1453,1458 (Fed. Cir. 1998). Further, the Examiner has not shown why Hori should be modified to *protect the desired surface of the substrate from the implantation beam from either the nature of the problem to be solved, the teaching of the prior art and the knowledge of persons of ordinary skill in the art*. *Id.* The Examiner must submit **objective evidence** and not rely on his subjective opinion in support of modifying Hori to *use a DUV photoresist*. *In re Lee*, 61 U.S.P.Q.2d 1430, 1434 (Fed. Cir. 2002). Further, the Examiner must submit **objective evidence** and not rely on his subjective opinion in support of modifying Hori to *protect the desired surface of the substrate from the implantation beam*. *Id.* Therefore, the Examiner has not presented a *prima facie* case of obviousness for rejecting claims 1, 4-5, 7-8, 11-12 and 14. Accordingly, one skilled in the art would not be able to recreate claims 1, 4-5, 7-8, 11-12 and 14 in view of the cited prior art.

B. Hori does not Teach or Suggest the Following Claim Limitations

Hori does not teach or suggest "providing a *thin photoresist layer* to the semiconductor device that covers a substantial amount of an active area comprising a source region and a drain region of the semiconductor device" as recited in claims 1

and 8. The Examiner simply directs Applicants' attention to columns 1-18¹ of Hori as disclosing the above-cited claim limitation. Paper No. 16, Page 4. The Examiner further refers to a mask layer as reading on a photoresist layer. Paper No. 16, Page 4. Upon review of the reference Hori, Applicants have been unable to identify a photoresist layer in the reference Hori. Photoresists are chemical compositions containing a lightness-sensitive material and suspension. These photoresists are used in the photolithographic process involving the transfer of an image from the mask to the surface of the wafer. Upon review of the reference Hori, Applicants have identified the following elements as being used as a mask: a gate electrode, spacers and films (SiO₂) on the source and drain regions. These masks are not a photoresist layer. Applicants respectfully assert that the Examiner has failed to point out in Hori where Hori teaches or suggests providing a thin photoresist to the semiconductor device. Accordingly, one skilled in the art would not be able to recreate claims 1 and 8 in view of the cited prior art. see fig. 3

Hori does not teach or suggest "providing the halo implant to the semiconductor device, wherein the thin *photoresist layer* is used as a mask" as recited in claims 1 and 8. For the reasons as stated above, Hori does not teach or suggest a *photoresist layer*. Accordingly, one skilled in the art would not be able to recreate claims 1 and 8 in view of the cited prior art.

For at least the above reasons, claims 1 and 8 are patentable over Hori. Claims 4-5, 7, 11-12 and 14 each recite combinations of features including the above combinations, and thus are patentable for at least the above reasons as well. Claims 4-5, 7, 11-12 and 14 recite additional features which, in combination with the features of the claims upon which they depend, are patentable over Hori.

¹ Columns 1-18 are the entire patent.

For example, Hori does not teach or suggest "wherein the photoresist layer comprises a *deep ultraviolet (DUV) layer*" as recited in claims 7 and 14. The Examiner states that "Hori et al. fails to teach mask comprising of a DUV photoresist." Paper No. 16, Page 4. The Examiner states that "Hori et al. fails to teach mask comprising of a DUV photoresist. Applicant acknowledges that is well known in the art to use DUV photoresist to implant the halo region (see page 1, lines 6-12). Therefore, it would have been obvious in the art at the same time the invention was made to modify Hori et al. to include halo mask comprised of a DUV photoresist. The ordinary artisan would have been motivated to modify Hori et al. in the manner described above for at least the purpose of protecting the desired surface of the substrate from the implantation beam." Paper No. 16, Page 4. As stated above, the Examiner must submit **objective evidence** and not rely on his subjective opinion in support of modifying Hori to provide a photoresist layer comprising a deep ultraviolet layer. *In re Lee* at 1434. Further, as stated above, the Examiner must submit **objective evidence** and not rely on his subjective opinion in support of modifying Hori to protect the desired surface of the substrate from the implantation beam. *Id.* Accordingly, one skilled in the art would not be able to recreate claims 7 and 14 in view of the cited prior art.

C. Conclusion

As a result of the foregoing, Applicants respectfully assert that the Examiner's *prima facie* case of obviousness is not taught or suggested by the cited prior art since there are numerous claim limitations not taught or suggested in the cited prior art, and thus one skilled in the art would not have been able to recreate claims 1, 4-5, 7-8, 11-12 and 14 in view of the cited prior art.

It is noted that words are italicized only for emphasis. Words that are italicized are not meant to imply that only those words are not taught or suggested in the cited prior art.

III. CONCLUSION

As a result of the foregoing, it is asserted by Applicants that claims 1, 4-5, 7-8, 11-12 and 14 in the Application are in condition for allowance, and respectfully request an early allowance of such claims.

Applicants respectfully request that the Examiner call Applicants' attorney at the below listed number if the Examiner believes that such a discussion would be helpful in resolving any remaining problems.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE**In the Specification:**

The paragraph beginning at line 7 of page 4 has been amended as follows:

Figure 2 is a diagram illustrating the semiconductor device 200 after a conventional halo implant. Accordingly oftentimes the halo implant 202 ends up providing dopant to all of the source region 204 and drain region 206. Since only the area directly underneath the gate 208 is the area of interest for the implant, there is leakage and other problems associated therewith. Accordingly, the entire active area 212 is open primarily because the thickness of the photoresist mask 213 [212] is such that at a 45° angle, the ultraviolet rays cannot accurately be provided underneath the gate area.

The paragraph beginning at line 14 of page 4 has been amended as follows:

As is seen, with a photoresist mask 213 [212] thickness of .5 μm , the 45° angle will require that a large portion of the ultraviolet radiation will not reach the area of interest because at that angle, with the thick photoresist, it is not possible. In addition, if a thick photoresist of (0.5 μm or greater) is placed over the trench oxidation 207, due to the soft jelly type nature of the photoresist, oftentimes the photoresist will fall over in the trench oxidation area and cover areas that are to be implanted. Even if the photoresist stands erect at the smaller process technologies, the halo implant will not reach the targeted areas.

In the Abstract:

The Abstract has been amended as follows:

A method and system for providing a halo implant to a semiconductor device is disclosed. The method and system includes [comprises] providing a thin photoresist layer that [is a thickness less than the gate height to the semiconductor

device, wherein the thin photoresist layer] covers a substantial amount of an active area including [comprising] a source region and a drain region of the semiconductor device. The method and system further includes providing the halo implant to the [to the] semiconductor device, using the thin photoresist layer as a mask.

Utilizing this thin photoresist layer, taking into account other height variables, the source and drain regions can be opened only as needed. At a 45° angle, the implant can be delivered to all transistors in the circuit in the targeted area as well as getting only a large amount of the dose (up to ¾ of the dose) to the transistor edge which sits on the trench edge.

(1) Claim 1 has been amended as follows:

1 1. (Thrice Amended) A method for providing a halo implant to a
2 semiconductor device [, the semiconductor device including a gate thereon, the
3 method] comprising the steps of:

4 (a) providing a thin photoresist layer to the semiconductor device that [,
5 wherein the thin photoresist layer is a thickness less than the gate height and] covers a
6 substantial amount of an active area comprising a source region and a drain region of
7 the semiconductor device; and

8 (b) providing the halo implant to the semiconductor device, wherein the
9 thin photoresist layer is used as a mask.

(2) Claim 8 has been amended as follows:

1 8. (Fourth Amended) A system for providing a halo implant to a
2 semiconductor device comprising:

3 means for providing a thin photoresist layer to the semiconductor device,
4 wherein the thin photoresist layer [is a thickness less than the gate height and] covers
5 a substantial amount of an active area comprising a source region and a drain region
6 of the semiconductor device; and

- 7 means for providing the halo implant to the semiconductor device, wherein
8 the thin photoresist layer is used as a mask.

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